The food contaminant fumonisin B_1 reduces the maturation of porcine $CD11R1^+$ intestinal dendritic cells, resulting in a reduced efficiency of oral immunisation and a prolonged intestinal ETEC infection

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Consumption of food or feed contaminated with fumonisin B_1 (FB_1), a mycotoxin produced by *Fusarium verticillioides*, leads to disease in humans and animals. This mycotoxin reduces the efficiency of parenteral vaccinations, indicating that ingestion of FB_1-contaminated food suppresses the systemic immune system. This study was conducted to elucidate the mechanisms by which FB_1 exerts its immunosuppressive effects on the intestinal immune system. Piglets were used as a model species for humans since their gastrointestinal tracts are very similar both on an anatomical and physiological level. The animals were orally exposed to a low dose of FB_1 (1 mg/kg body weight) for 10 days which did not result in any clinical signs. However, when compared to control animals, FB_1-exposed animals demonstrated a prolonged excretion of the porcine-specific enteropathogen $F4^+$ enterotoxigenic *E. coli* ($F4^+$ ETEC) following infection. Upon oral immunisation with purified F4 fimbriae, FB_1 exposure reduced the intestinal antigen-specific immune response as compared to control animals. Further analyses to elucidate the mechanisms behind these observations revealed a reduced expression of IL-12p40 mRNA by intestinal immune cells. Since this cytokine is mainly secreted by antigen presenting cells, we analysed the effects of FB_1 on small intestinal $CD11R1^+$ lamina propria dendritic cells (LPDC). These $CD11R1^+$ LPDC matured in response to stimulation with the ETEC-derived virulence factors, F4 fimbriae and flagellin, indicating that this intestinal DC subset is involved in the induction of protective immunity. However, *in vivo* exposure of piglets to FB_1 impaired the functional maturation of F4 fimbriae- and flagellin-stimulated $CD11R1^+$ LPDC as evidenced by a decreased upregulation of MHCII and CD80/86 and a reduced T cell stimulatory capacity. These results indicate an FB_1-mediated reduction of *in vivo* DC maturation and stress the need to reduce exposure of animals and humans to FB_1 in order to enhance the efficacy of vaccination programs.